DETAILED ACTION

1. This Office action is in response to the amendment filed September 4, 2009, which amends the specification and claims 1-12 and adds claims 13-20. Claims 1-20 are pending.

Response to Amendment

2. All objections to the specification set forth in the Office action mailed May 4, 2009 are overcome by amendment of the specification.

3. The rejection of claims 5 and 7 under 35 U.S.C. 112, 2nd paragraph set forth in the Office action mailed May 4, 2009 is overcome by claim amendment.

4. The rejection of claims 1-3, 8, and 12 under 35 U.S.C. 102 set forth in the Office action mailed May 4, 2009 are overcome by claim amendment.

5. All rejections under 35 U.S.C. 102 set forth in the Office action mailed May 4, 2009, are overcome by claim amendment.

6. The rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Hatwar (US 2003/0068524) in view of Hosokawa et al. (US 6534199) as set forth in the Office action mailed May 4, 2009 and the rejections of claims 9-11 under 35 U.S.C. 103(a) as being unpatentable over Hatwar (US 2003/0068524) in view Fukuoka et al. (JP 2003-272857) as set forth in the Office action mailed May 4, 2009 are overcome by claim amendment.

7. The rejections of claims 4 and 5 under 35 U.S.C. 103(a) as being unpatentable over Hatwar (US 2003/0068524) in view Shi et al. (US 2002/0028346) as set forth in the

Office action mailed May 4, 2009, the rejections of claims 6 and 7 under 35 U.S.C. 103(a) as being unpatentable over Hatwar (US 2003/0068524) in view Kohama et al. (JP 2002-063988) as set forth in the Office action mailed May 4, 2009, and the rejections of claims 1-5 and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuoka et al. (WO 2005/011333) in view of Shi et al. (US 2002/0028346) as set forth in the Office action mailed May 4, 2009 are withdrawn.

8. The provisional double patenting rejections set forth in the Office action mailed May 4, 2009 are overcome due to claim amendment.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5 and 8-12 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 1-5 and 8-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"), wherein a machine translation if used as the English translation.

13. Regarding claims 1-5 and 8-20, Ikeda teaches an organic electroluminescent device comprising an anode, a hole injecting layer composed of TPD232 (applicants' formula (X)) disposed on the anode (claims 15 and 16, paragraphs [0143] and [0151]), a hole transporting layer composed of BPTPD (applicants' formula (XI)) disposed on the hole injecting layer (claims 17 and 18, paragraphs [0143] and [0151]), a light emitting layer disposed on the hole transporting layer, an electron transporting layer composed of Alq disposed on the light emitting layer (claims 19 and 20, paragraph [0143] and [0151]), and a cathode disposed on the electron transporting layer (paragraphs [0143] and [0151]). Ikeda further teaches that the light emitting layer is composed of an asymmetric compound that emits blue light and the asymmetric compound can be a host material (claims 2 and 3) (paragraphs [0143] and [0151], compound A1, Table 1). Ikeda teaches the asymmetric compound is a host material for a blue emitting styrylamine based light emitting molecule (claims 3, 8, 13, and 14) (paragraphs [0151] and [0152]) compound D1). Ikeda teaches A1 and A2 as a preferred asymmetric compound (claims 1, 4, and 5) (paragraphs [0046], [0143], [0146] and [0151]). A1 reads on formula (1) where R^1-R^8 are hydrogen, Ar^1 is an unsubstituted aryl group

having 10 nuclear carbon atoms, and Ar^2 is a substituted aryl group having 20 nuclear carbon atoms (claims 1 and 4). A2 reads on formula (II) where Ar is a substituted aryl group having 20 nuclear carbon atoms, Ar' is an unsubstituted aryl group having 6 nuclear carbon atoms, X is an unsubstituted aryl group having 6 nuclear carbon atoms, a and b are zero, and c is 1 (claims 1 and 5). Ikeda further teaches the blue light emitting layer has a thickness of 40 nm (paragraphs [0143] and [0151]).

14. Ikeda does not teach where the organic electroluminescent device emits white light and furthers comprises a yellow light emitting layer, wherein the yellow light emitting layer comprises the same host material as the blue light emitting layer and contains a dopant with multiple fluoranthene skeletons.

15. Fukuoka teaches a white light organic electroluminescent device, comprising in order an anode, a bluish color light emitting layer disposed on the anode, a yellow-to-reddish color light emitting layer disposed on the bluish color light emitting layer and a cathode disposed on the yellow-to-reddish color light emitting layer (paragraph [0013]). Fukuoka teaches that the yellow-to-reddish color light emitting layer contains the same host material as the bluish color light emitting layer (paragraph [0038]). Fukuoka further teaches the yellow-to-reddish color light emitting layer comprises a dopant, which is a compound having multiple fluoranthene skeletons (paragraphs [0038]-[0043], [0048]-[0050], and [0052]). Fukuoka teaches the yellow-to-reddish color dopant has a fluorescent peak wavelength 540 nm to 700 nm (paragraph [0058]). Fukuoka teaches the bluish color light emitting layer can have a thickness of 5 nm to 30 nm and the thickness of the yellow-to-reddish light emitting layer is 10 nm to 50 nm (claim 12)

(paragraph [0059]). Fukuoka teaches this type of organic electroluminescent device produces a white light organic electroluminescent device with increased luminous efficiency and better white luminescence (paragraphs [0004]-[0006]).

16. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to electroluminescent device of Ikeda to include a yellow-to-reddish color light emitting layer disposed between the bluish color light emitting layer and the cathode, wherein the yellow-to-reddish color light emitting layer comprises the same host material as the bluish color light emitting layer, a dopant with a fluorescent peak wavelength of 540 nm to 700 nm, and a compound having multiple fluoranthene skeletons, and wherein the thickness of the both light emitting layer is above 5 nm. The motivation would have been to produce a white light organic electroluminescent device with increased luminous efficiency and better white luminescence.

17. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter “Fukuoka”), wherein a machine translation if used as the English translation, as applied to claims 1-5 and 8-20 above, and further in view of Suzuki et al. (US 2002/0177009) (hereafter "Suzuki").

18. Ikeda in view of Fukuoka does not teach where the asymmetric compound is a compound that comprises a pyrene (formulae (V)-(IX)).

19. Suzuki teaches an organic luminescent device wherein the blue light emitting layer comprises an asymmetric pyrene compound (paragraphs [0093]-[0101], compound 27). Suzuki teaches formula (X), which can be bound to any of the formula (I)-(VII) (paragraph [0020]). Suzuki further teaches that R_{21} can be a substituted or unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl (paragraphs [0021] and [0035]) leading to asymmetric pyrene groups. In compound 27, Suzuki teaches an asymmetric pyrene wherein both the applicants' Ar^3 and Ar^4 positions in formula (V) contain either a substituted or unsubstituted aryl group.

20. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed an asymmetric compounds using formula (X) of Suzuki because Suzuki teaches that R_{21} can be a substituted or unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl, and the pyrene unit further comprises a substituted phenyl group, which would result in asymmetric compounds. One would expect the formation and use of an asymmetric compound using formula (X) to result in a device having very high efficiency and luminance because such a compound is within the teachings of Suzuki as a desirable material for forming an organic layer of an organic electroluminescent device.

21. Suzuki also teaches compound 27, an asymmetric pyrene, which reads on formula (VI) where Ar^5 is an unsubstituted aryl group having 16 nuclear carbon atoms, Ar^6 is a substituted aryl group having 32 nuclear carbon atoms, X^2 is a substituted aryl group having 32 nuclear carbon atoms, n^1 and e are 1, and d is zero.

22. Suzuki teaches the desirable fused polynuclear aromatic compounds provide organic electroluminescent devices with very high efficiency and luminance and high durability (paragraphs [0011] and [0012]).

23. Given the teachings of Suzuki it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electroluminescent device of Ikeda in view of Fukuoka with an asymmetric pyrene compound as taught by Suzuki. Suzuki and Ikeda both teach the use of fused polynuclear aromatic compounds are compounds that can be used as light emitting layer of electroluminescence devices, but only Suzuki teaches the use of pyrenes as one of the fused polynuclear aromatic compounds. The motivation would have been to provide organic electroluminescent devices with very high efficiency and luminance and high durability.

24. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter “Fukuoka”), wherein a machine translation if used as the English translation, as applied to claims 1-5 and 8-20 above, and further in view of Igarashi (US 2001/0008711) (hereafter “Igarashi”).

25. Ikeda in view of Fukuoka does not teach where the asymmetric compound is a compound that comprises a pyrene (formulae (V)-(IX)).

26. Igarashi teaches formula (2), Ar^{11}-Ar^{13} each represents an anthracence structure, a phenathrene structure, or a pyrene structure (paragraphs [0029] and [0030]). Igarashi

shows in compound (I-6) that the pyrene units can contains aryl groups at both the applicants' Ar^3 and Ar^4 positions and further shows in compound (I-19) that not all the Ar^{11}-Ar^{13} have to be the same.

27. Given the teachings of Igarashi it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed an asymmetric compounds using formula (2) of Igarashi because Igarashi teaches that Ar^{11}-Ar^{13} each represents an anthracence structure, a phenathrene structure, or a pyrene structure and the these structures can contain a substituent. Igarashi shows that when pyrene is selected it can be substituted with a phenyl group (compound (I-6)) and that not all the Ar^{11}-Ar^{13} have to be the same (compound (I-19); therefore, a compound can be made that reads on applicants' formula (V) where Ar^3 is a substituted aryl group having 46 nuclear carbon atoms and Ar^4 is an unsubstituted aryl group having 6 nuclear carbon atoms. One would expect the formation and use of an asymmetric compound using formula (2) to result in a device having good luminescence properties because such a compound is within the teachings of Igarashi as a desirable material for forming an organic layer of an organic electroluminescent device.

28. Igarashi teaches the use of materials as compound to be used in the light emitting layer of an electroluminescent device (paragraph [0042]) and provide a light emitting device with good luminescence properties (paragraph [0005]).

29. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electroluminescent device of Ikeda in view of Fukuoka with an asymmetric pyrene compound as taught by Igarashi. Igarashi and

Ikeda both teach the use of fused polynuclear aromatic compounds are compounds that can be used as light emitting layer of electroluminescence devices, but only Igarashi teaches the use of pyrenes as one of the fused polynuclear aromatic compounds. The motivation would have been to provide organic electroluminescent devices with good luminescence properties.

Conclusion

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
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